KubeStellar

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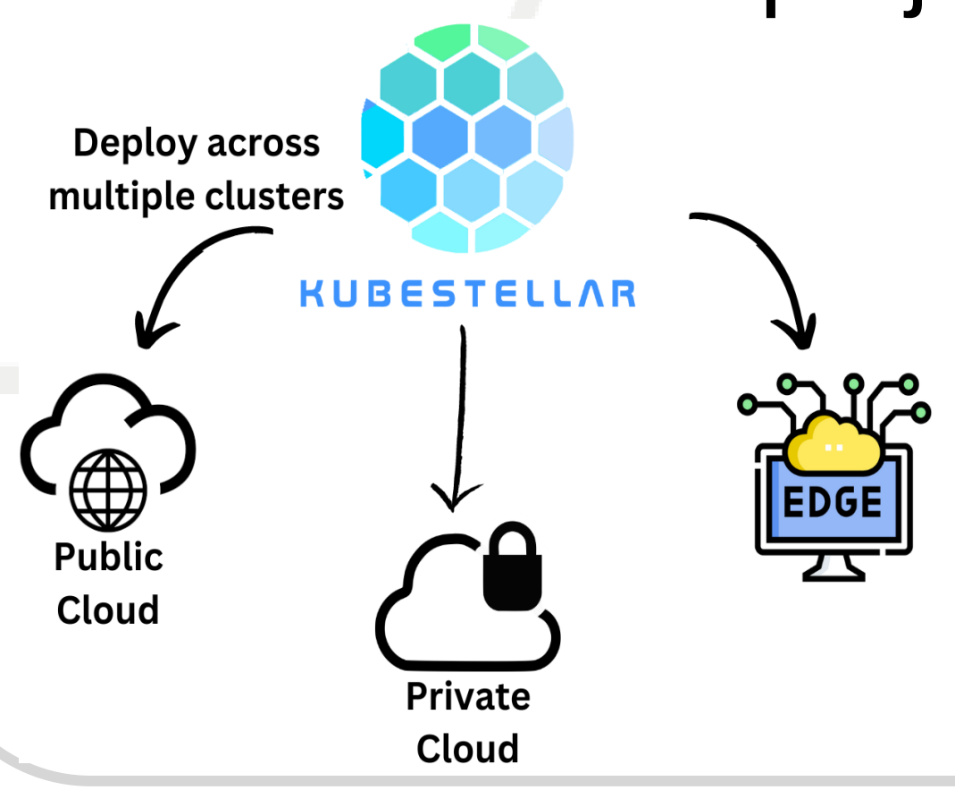
Project Overview

Kubernetes clusters are groups of servers that work together to run applications. They are used to manage and scale containerized applications.

KubeStellar is a project by the Cloud Native Computing Foundation (CNCF) designed to make it easier to deploy and manage applications on multiple Kubernetes clusters.



Goals and Milestones

- Installing a Kubernetes Distribution and learning its uses
- Optimizing the workspace by using autocomplete/aliases
- Deploy game 2048 yaml via cluster using Kubernetes distribution
- Installing helm and ingress nginx controller via helm
- Installing KubeStellar helm core chart and using it deploy game 2048
- KubeStellar installation script

Open Source Outcomes

- Opened more than 30 issues related to bugs/features
- Raise more than 10 PRs to repair documentation, code, installation, etc.
- Published 8 blog posts on medium, where 1 is a YouTube tutorial on how to deploy game-2048 onto two different remote clusters
- Used our experiences to confirm & challenge assumptions made by project maintainers
- Found mechanical and functional errors in KubeStellar's documentation and installation scripts
- Enhanced documentation by removing redundant and confusing content, which should help with project adoption
- Reinforced quality checks like the need for continuous spelling checks

Highlights and Accomplishments – SubProject 1

Aim: The goal is to install Kubernetes and create a remote cluster on which the game called '2048' is to be deployed. Additionally, collect feedback on the process of setting up the environment and using Kubernetes-native deployment tools like kubectl, helm, kind.

Installations

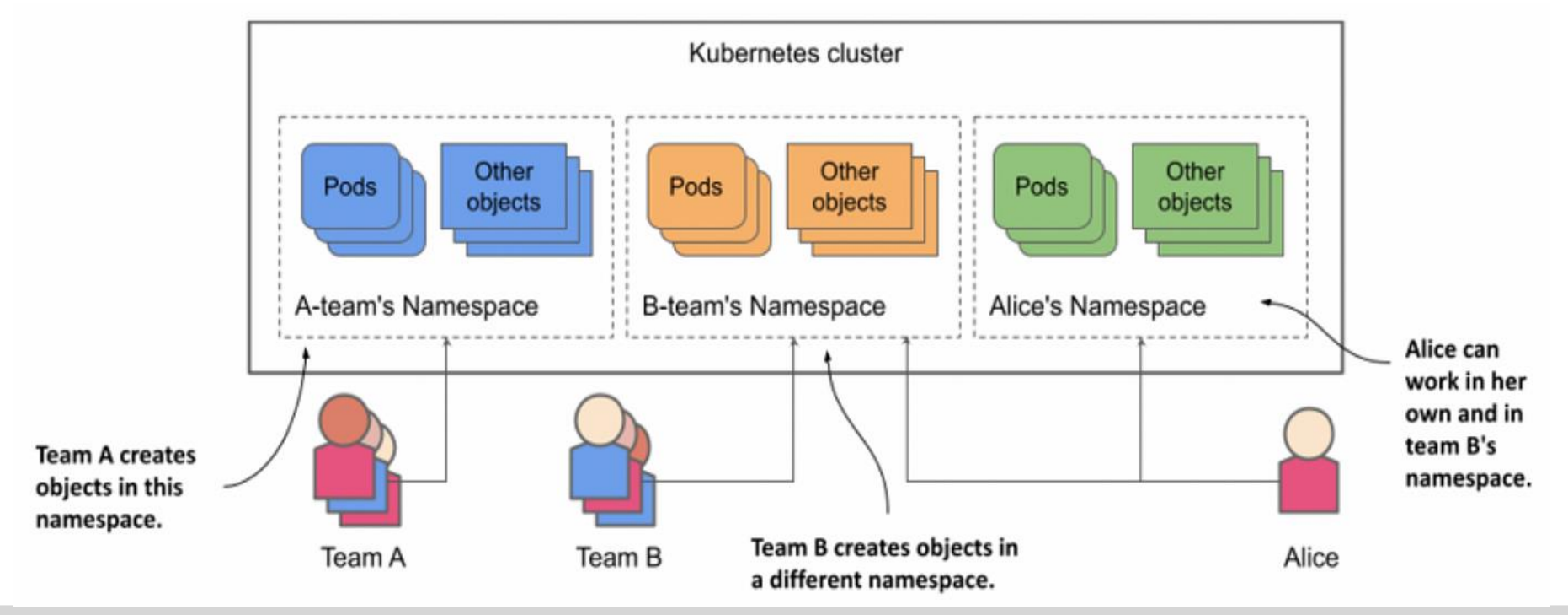
- Go lang
- Docker
- Kind, Minikube
- Kubectl, Kubectx
- Helm
- Kubernetes

Productivity:

- Aliases
- OhMyZsh terminal & powerlevel10k theme, fonts, context display

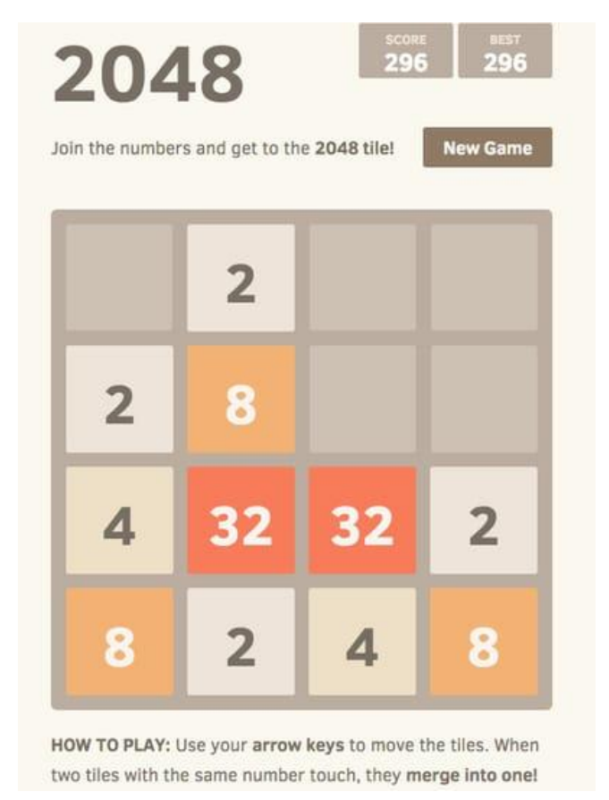
Steps

- Used kind to create a remote cluster
- Created a yaml file for Game2048
- Used kubectl to deploy this:
  `kubectl apply -f deployment.yml`
- Open the URL where the app is running:
  `minikube service service-2048 -n game-2048`


Kubernetes cluster
Pods
Other objects
A-team's Namespace
Pods
Other objects
B-team's Namespace
Pods
Other objects
Alice's Namespace
Alice can work in her own and in team B's namespace.
Team A creates objects in this namespace.
Team A
Team B
Team B creates objects in a different namespace.
Alice

Kubernetes Cluster

- **Namespace**: Isolates resources for the game.
- **Deployment**: Manages 5 instances of the 2048 application.
- **Service**: Exposes the application within the cluster and on a NodePort.
- **Ingress**: Provides external access to the application like HTTP or HTTPS. It can also provide load balancing.

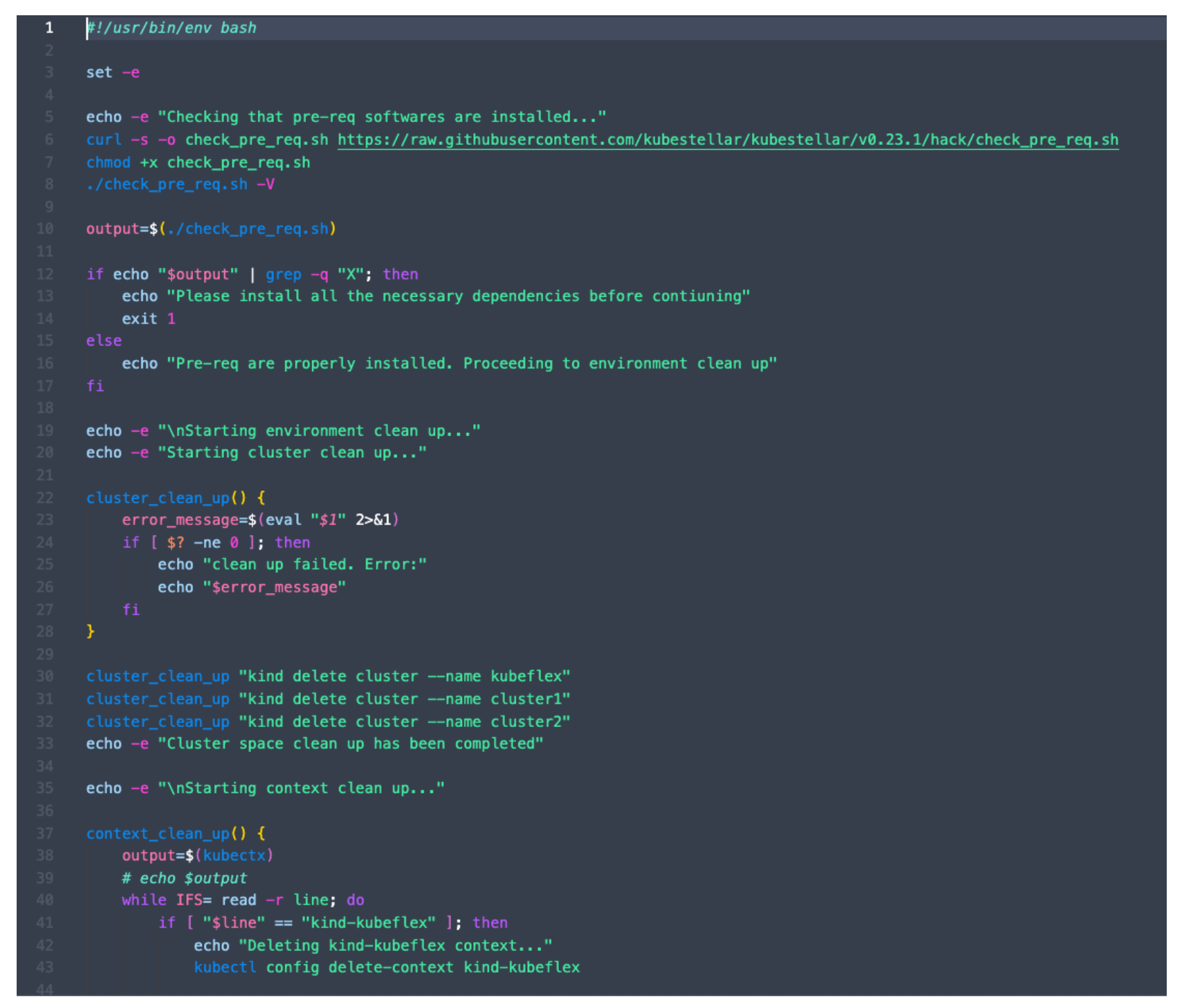


Highlights and Accomplishments – SubProject 2

Aim: The goal is to document the usage of KubeStellar helm core chart to deploy game 2048 onto 2 different remote cluster. We also want to create a script that creates 2 remote clusters seamlessly.

Steps

- Create 1 cluster called kind-kubeflex and 2 remote called cluster1 and cluster2
- Apply the deployment file onto the kind-kubeflex
- Check to see if the pods are ready on both clusters by switching context
- Open the link to both clusters in a browser

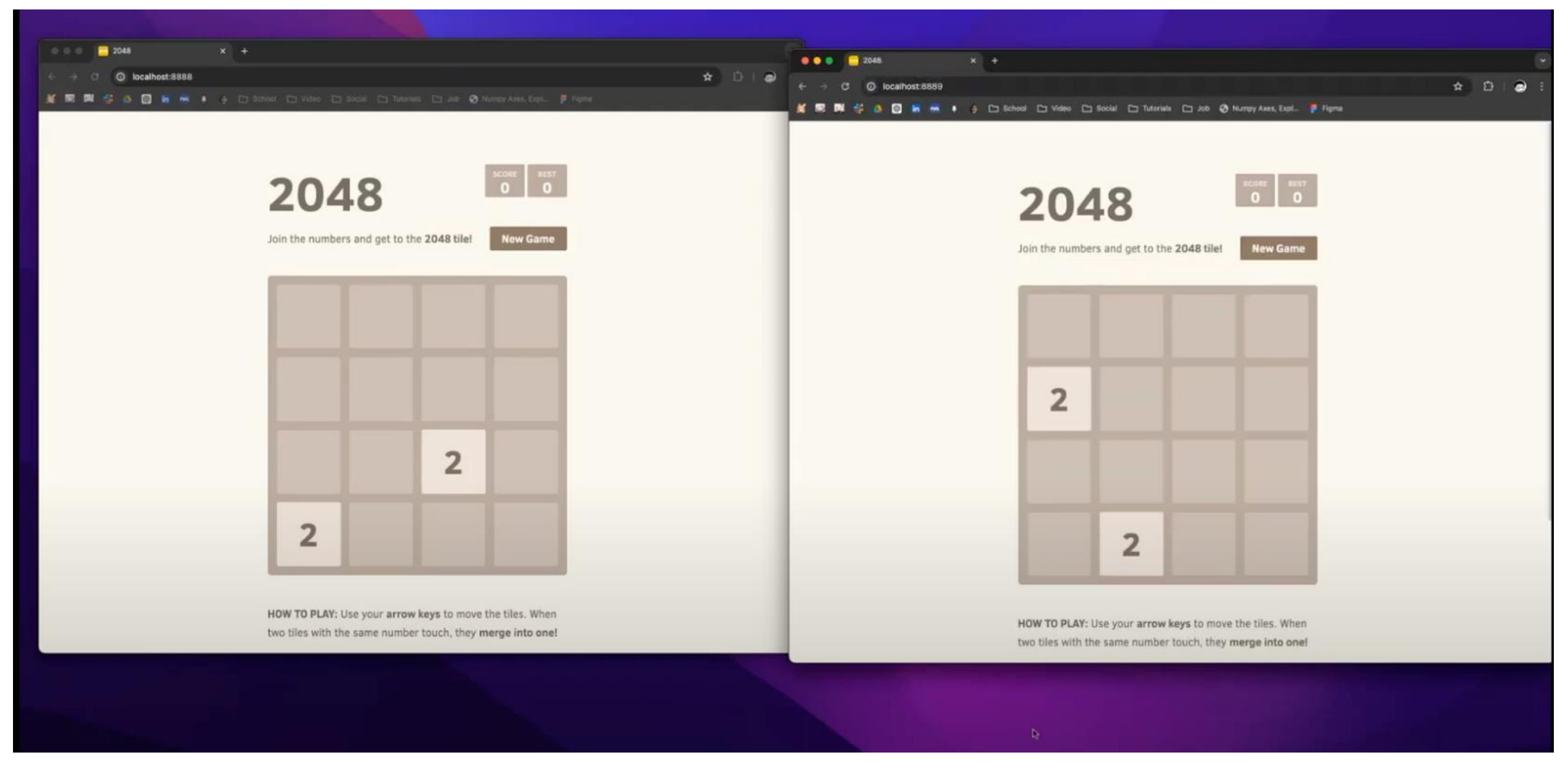


```
#!/usr/bin/env bash

set -e

echo -e "Checking that pre-req softwares are installed..."
curl -s -o check_pre_req.sh https://raw.githubusercontent.com/kubestellar/kubestellar/v0.23.1/hack/check_pre_req.sh
chmod +x check_pre_req.sh
./check_pre_req.sh -V

output=$(./check_pre_req.sh)

if echo "$output" | grep -q "X"; then
    echo "Please install all the necessary dependencies before contiuning"
    exit 1
else
    echo "Pre-req are properly installed. Proceeding to environment clean up"
fi

echo -e "\nStarting environment clean up..."
echo -e "Starting cluster clean up..."

cluster_clean_up() {
    error_message=$(eval "$1" 2>&1)
    if [ $? -ne 0 ]; then
        echo "clean up failed. Error:"
        echo "$error_message"
    fi
}

cluster_clean_up "kind delete cluster --name kubeflex"
cluster_clean_up "kind delete cluster --name cluster1"
cluster_clean_up "kind delete cluster --name cluster2"
echo -e "Cluster space clean up has been completed"

echo -e "\nStarting context clean up..."

context_clean_up() {
    output=$(kubectx)
    # echo $output
    while IFS= read -r line; do
        if [ "$line" == "kind-kubeflex" ]; then
            echo "Deleting kind-kubeflex context..."
            kubectl config delete-context kind-kubeflex
```

Bash Script

- 15+ lines of command to create 2 new remote clusters
- Create a script that cleans out old clusters and reactivate inactive pods
- Increase cluster creation efficiency by 25%
- Still takes about 5 minutes to create the clusters using this script

[Demo Link]



Future Work

- Fix/Critique KubeStellar's Documentation
- Improve script runtime to reduce cluster's creation time
- Fix port-forwarding issue with the clusters to deploy game-2048
- Work on windows version of the documentation on KubeStellar

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